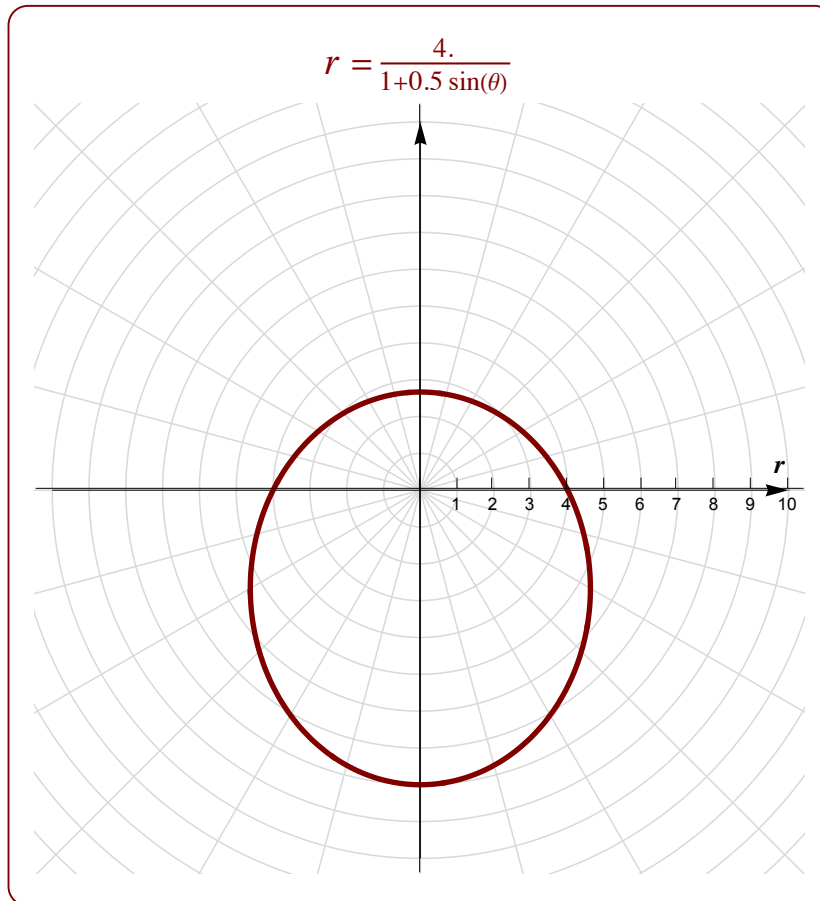


10.6 Polar Equations of Conics

The polar form of a conic is given by either

$$r = \frac{ed}{1 \pm e \sin(\theta)} \quad \text{or} \quad r = \frac{ed}{1 \pm e \cos(\theta)}$$

where the type of conic is determined by the eccentricity e .



Type of Conic

A polar equation of the form

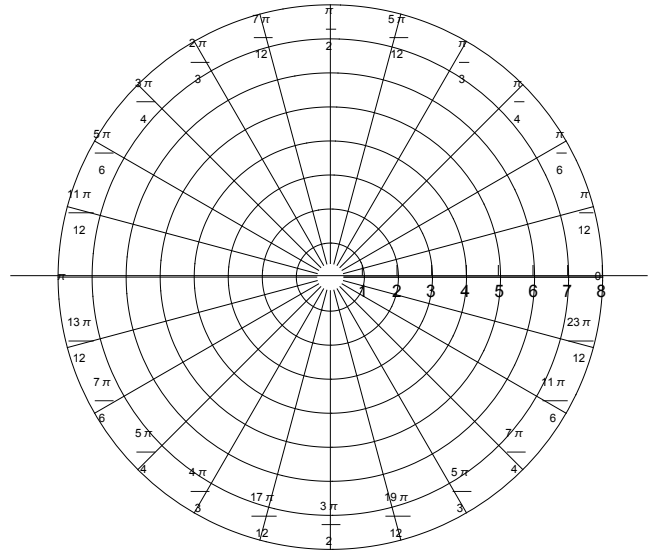
$$r = \frac{ed}{1 \pm e \sin(\theta)} \quad \text{or} \quad r = \frac{ed}{1 \pm e \cos(\theta)}$$

represents a conic with **one focus at the origin**, **eccentricity e** , and **directrix d** . The conic is

1. a parabola if $e = 1$
2. an ellipse if $0 < e < 1$
3. a hyperbola if $e > 1$

Example 1 Find the polar form of the parabola with vertex at $(0, -1)$ and focus at $(0, 0)$. Convert the polar equation to rectangular coordinates to verify your equation.

Example 2 Find the eccentricity and identify the conic, and sketch the conic $r = \frac{8}{3+3\cos(\theta)}$.



Example 3 Find the eccentricity and identify the conic, and sketch the conic $r = \frac{5}{2-3\sin(\theta)}$.

